**DEFINITIONS:**

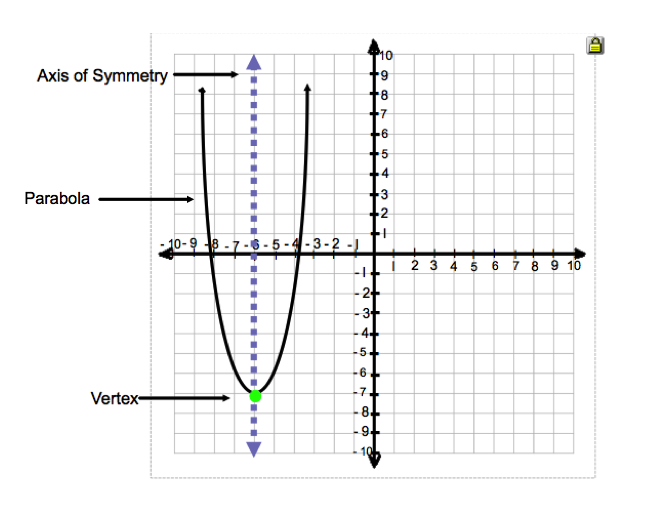
Quadratic Equation = any equation that has an x2 – term

Example: 

Parabola = the U-shaped graph of a quadratic equation. The U can open upwards (as shown below) or it can open down.

Vertex = the point where the two sides of the parabola meet

Axis of Symmetry = the vertical line that goes through the vertex and splits the parabola into two symmetrical (exactly the same) halves



**Reading a Quadratic Equation:**

Quadratic equations are any equation that has an x2 – term in it. As we already know, *linear* equations are usually written in the for y = mx + b. However, *quadratic* equations have their own form and are usually written in the form:

y = ax2 + bx + c (where “a”, “b”, and “c” are numbers)

Example 1: y = -3x2 + 6x + 9

In this example, a = -3, b = 6, and c = 9

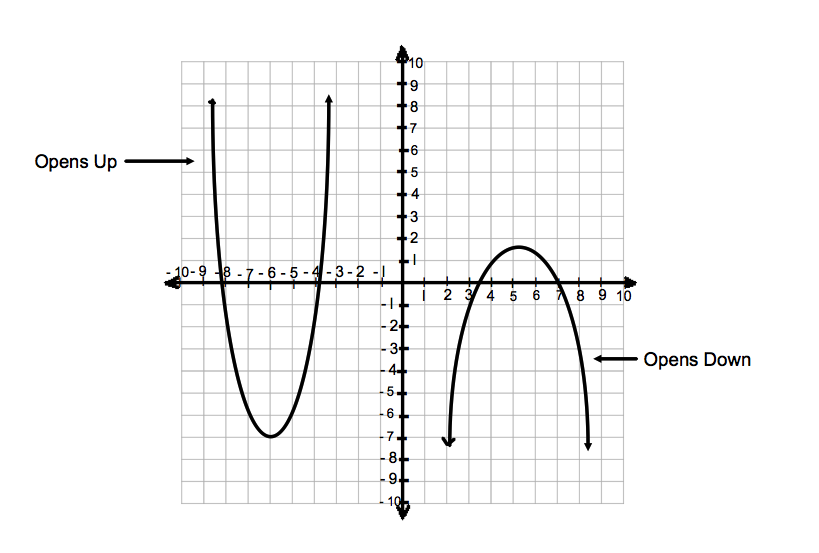
Example 2: y = x2 + 2x - 3

In this example, a = 1 (we put a 1 as the coefficient for x2), b = 2, and c = -3

Reminder! Be careful of the signs for a, b, and c.

**Different Types of Parabolas:**

When we graph a quadratic equation, we get a parabola. Sometimes the parabola will open up and sometimes it will open down.



**Note:** No matter where the parabola is on the graph, it can always open either up or down. The location has no impact on the direction in which the parabola opens.

While location does not determine the direction in which the parabola opens, there is a part of the quadratic equation that does determine the direction. If **“a” is positive, then the** **parabola will open UP**. If the **“a” is negative, then the parabola will open DOWN.**

The parabola in Example 1 above will open down because “a” is negative. On the other hand, the parabola in Example 2 will open up because “a” is positive.

**Axis of Symmetry:**

The axis of symmetry of a parabola is always a vertical line that goes directly through the vertex. The axis of symmetry cuts the parabola exactly in half. The half of the parabola that is on one side of the axis of symmetry is exactly the same, but opposite the other side. It’s like a mirror image (it’s said that one side is the *reflection* of the other across the axis of symmetry.

We can write the equation of the axis of symmetry by finding the x-value of the vertex saying that x = that value. We will discuss this in more detail in the next lesson.